700 MHz

Serving Public Safety and Commercial Users through Shared Networks

4G LTE Broadband

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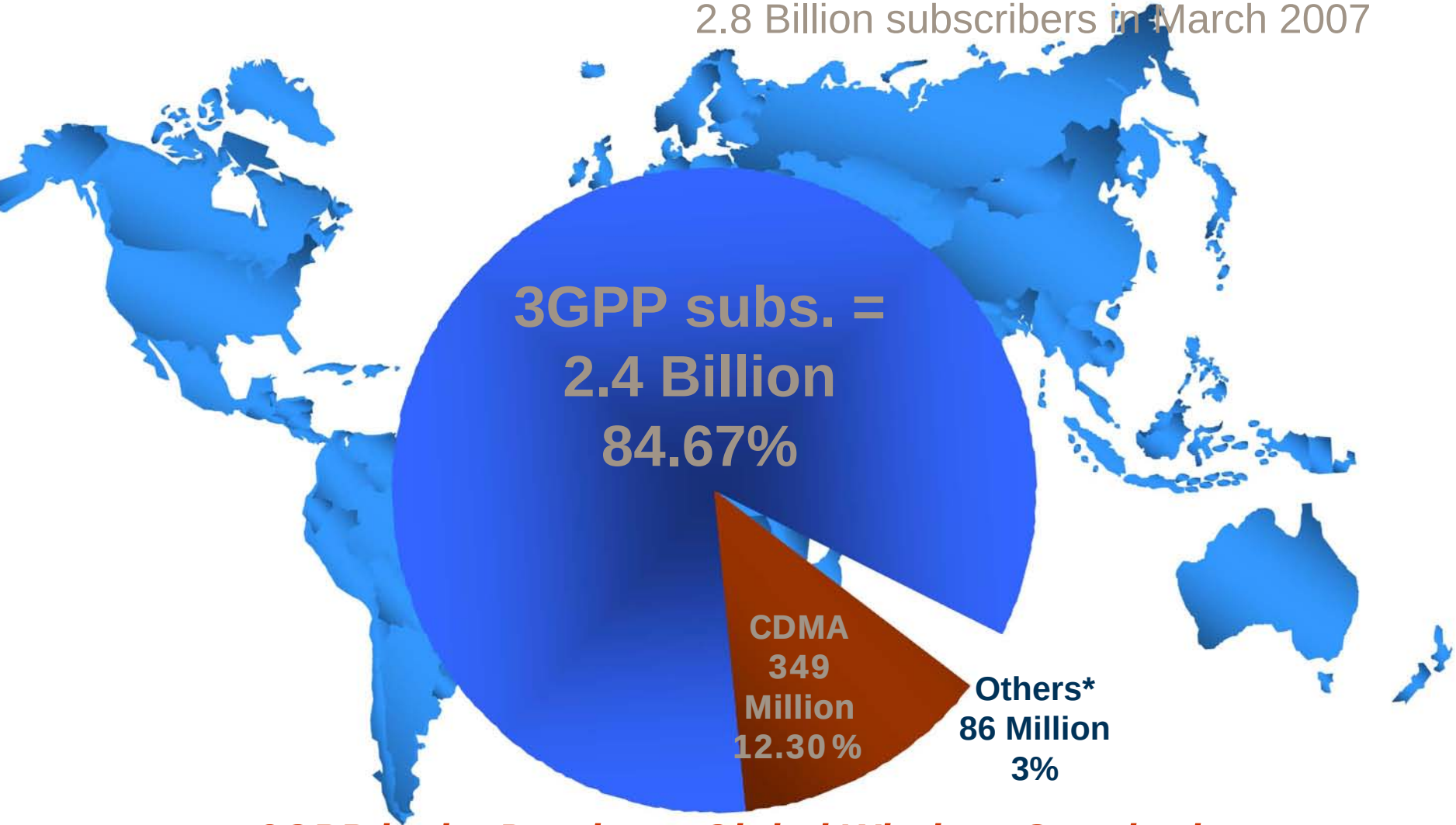
EVP and GM, Government

The World Wireless Market-Today

Subscribers by Technology

2.8 Billion subscribers in March 2007



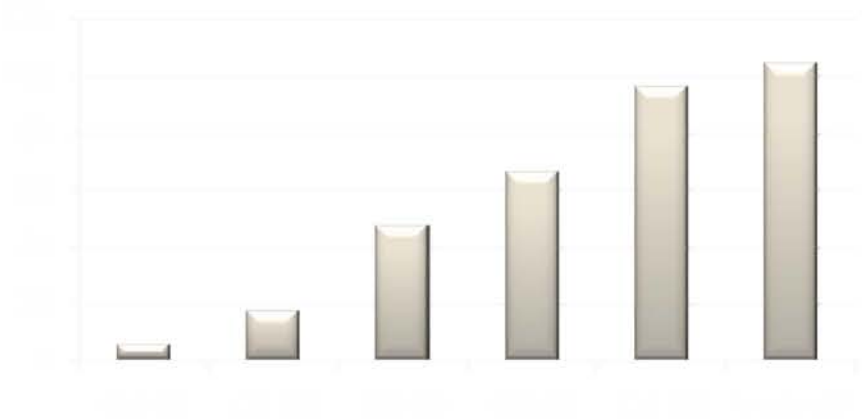
3GPP is the Dominant Global Wireless Standard –
LTE is the Next Step within the Standard

Source: Informa Telecoms & Media Estimates, March 2007

***Others includes TDMA, iDEN and PDC**

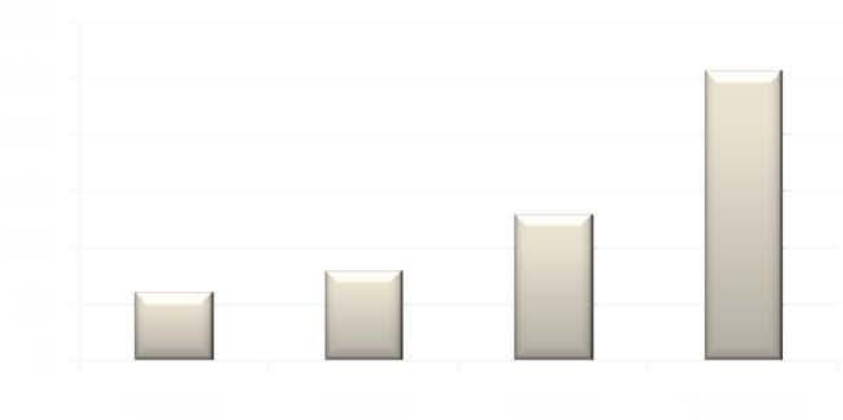
Public Safety will flourish with a robust supplier community: The HSPA example: HSPA status (April 2007)

Commercial HSPA launches world-wide



- Over ***500 million*** HSPA subscribers **in less than 1.5 years**
- Over ***250 HSPA devices*** in the market from ***60+ vendors***
- 104 networks in commercial operation in 53 countries
- Today's available peak speed: 14.4 Mbps (down-link, 1.8 up-link)

HSPA device availability



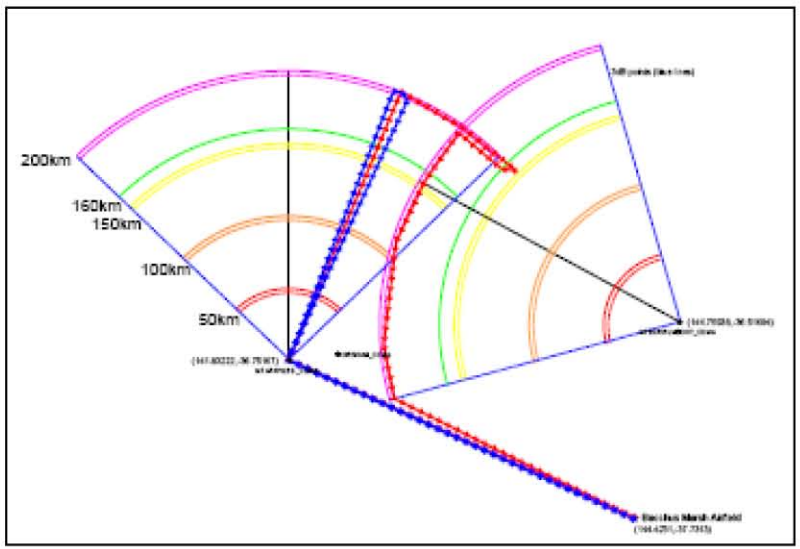
Source: GSA HSPA Commitments/Devices Survey

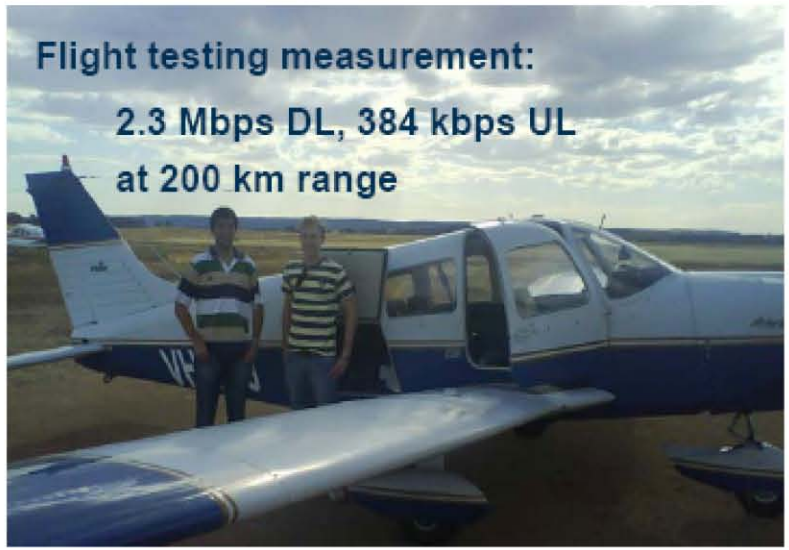
HSPA device types

Source: GSA HSDPA Devices Survey

3GPP Broadband for Public Safety

- **The RAN solution** (frequency band independent)
  - 40W RBS output power, **6dB** higher pilot (39 dBm)
  - UE access allowed down to -119 dBm, **4dB** gain
  - Best in class RBS sensitivity
  - 80 / **200 km** extended range feature
- *Telstra: Continent wide Australian HSPA network at 850 MHz*
- *Covering 98% of population with 5000 sites (1.9 million km²)*
  - *14.4 Mbps DL and 1.8 Mbps UL network*
  - ***2.3 Mbps** DL measured at **124 mile range***
  - *7.2 Mbps DL measured at 50 mile range*
  - *4.5 Mbps DL measured typical throughput*





Range and Coverage necessary to build broadband network with public safety's required footprint.

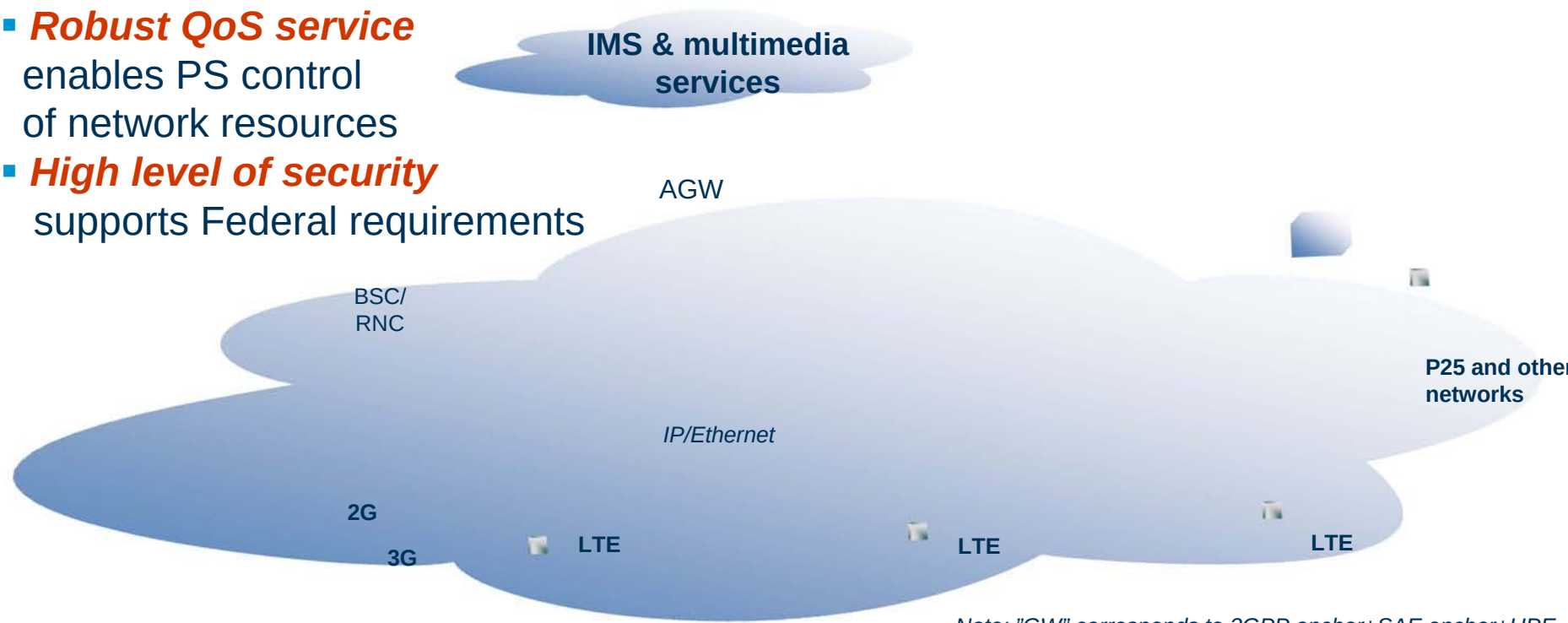
700 MHZ Public Safety Requirements

- Public/Private Network Sharing with Preemption for Public Safety users is feasible today
- High broadband speeds with low latency and wide coverage for video and critical content delivery
- QOS – flexible priority handling at admission/congestion
  - Users, applications, services
- Security and authentication
- Highly reliable access anywhere – mobility and session continuity across networks with local control
- Tiered Command and Control capabilities insure local control with seamless mobility, coordination and handover of incidences between layer

The 4G LTE Standard Meets and Exceeds Public Safety requirements

4G LTE/Shared Networks for Public Safety

- Evolution of HSPA to LTE
- Flat 2-node IP architecture Integrates multiple network access types for Optimum Network footprint
- ***Higher Broadband speeds*** (100MB/sec DL in 20 MHz) improve user efficiency
- ***Lower latency*** (<10 ms) insures robust video and voice
- Similar ***superior range*** as HSPA (SC-FDMA uplink) reduces network cost
- ***Efficient interworking with other 2G/3G networks*** enhances communications
- ***Robust QoS service*** enables PS control of network resources
- ***High level of security*** supports Federal requirements

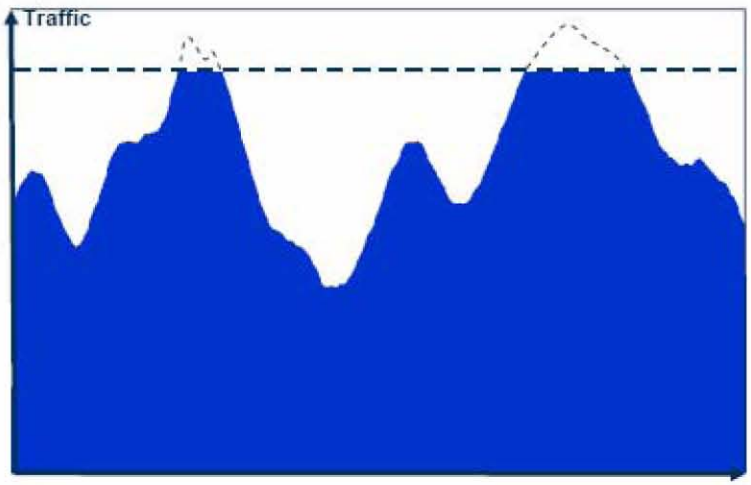


Note: "GW" corresponds to 3GPP anchor+SAE anchor+UPE

3GPP Technologies Support Private/Public Shared networks

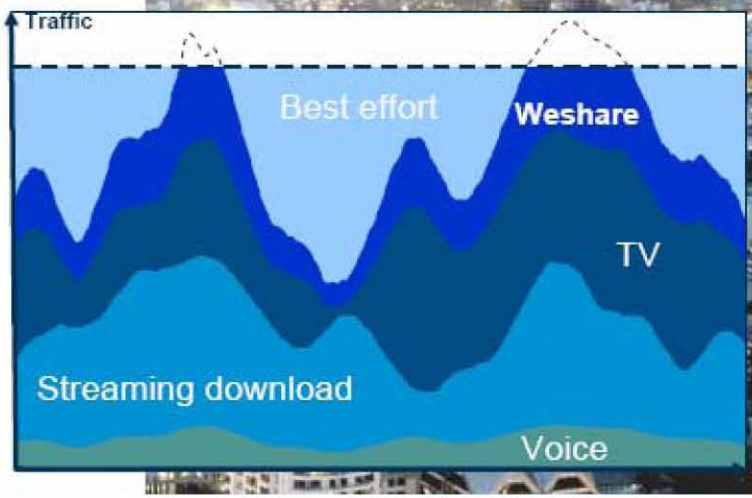
Historical Cellular View

- Few services
- Similar/narrow bandwidth
- One GoS (plus best effort)



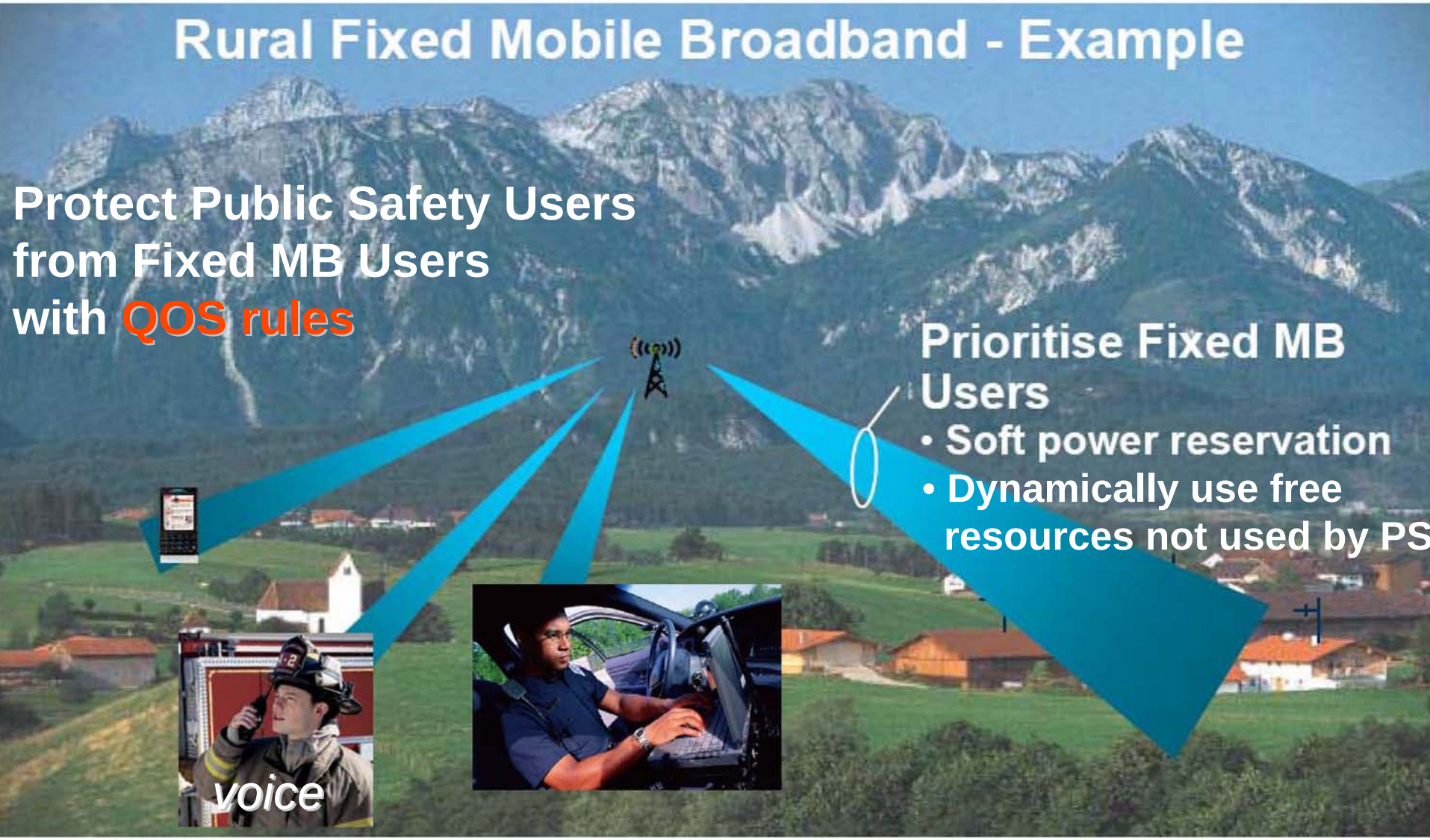
Today's 3GPP View

- Many services
- Large bandwidth differences
- Dynamic bandwidth needs
- Different GoS



Public Safety Needs Insured and Protected

LTE Allows for Shared Networks



Serving Public Safety and Commercial Users through Shared Networks- 4G LTE Broadband

- **Leverages 3GPP global economies of scale for attracting a large and robust community of device, application, and service developers**
- **Insures interoperability, backward compatibility, and continuous technology and service evolution**
  - **Devices will work on LTE, HSPA, EDGE, Wi-Fi, and P25 networks. Allows roaming to other cellular networks optimizing available wireless resources for public safety users**
- **High broadband speeds and power efficient radio technologies provide the national coverage needed without Project 25/wideband**
- **Key Public Safety Mission Critical features are included (Range, Security, QoS, low latency, priority/pre-emption, multicast/broadcast) and tiered command and control with local agency control of users**

LTE: Enabling Public/Private Partnerships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